Computational Mathematics (BS)

The Computational Mathematics Concentration provides broad math education with an emphasis on computer and mathematical models as tools to solve real-world problems. Students graduating in this concentration would be qualified to look for jobs, for example, in actuarial companies, finance, machine learning industry or apply to grad schools in computational and data-driven sciences, like computer science, engineering or medical research.

Common Requirement

All students pursuing a Math BS Degree must complete the Core Requirement, Capstone Requirement, and Science Requirement.

Core Requirement

The following eleven courses are required by all concentrations.

- MATH140 - Calculus I
- MATH141 - Calculus II
- MATH242 - Multivariable and Vector Calculus
- MATH260 - Linear Algebra I
- MATH265 - Discrete Structures in Mathematics
- MATH270/310 - Applied Ordinary Differential Equations
- MATH291 Mathematical Software
- MATH314/280 - Introduction to Proofs
- MATH345 - Probability and Statistics
- PHYSIC113 - Fundamentals of Physics I
- CS 110 - Introduction to Computer Programming

Capstone Requirement

The capstone allows a student to demonstrate the ability to use the knowledge, concepts, and methods acquired in the mathematics major. The capstone requirement may be met through any of the courses with numbers between 420-499.

Science Requirement

Students have to take 4 science courses according to the following rules:

- PHYSIC114 – Fundamentals of Physics II
- Three science courses (excluding Physics 113 and 114 and CS 110) offered by Biology, Chemistry, Computer Science, Engineering or Physics Department. These courses have to be required courses for a major in a program offered by the respective department; one of these three courses can be a lab.

Concentration Requirement

In addition, students declaring the Computational Math concentration must take the following courses:

- MATH425 - Numerical Analysis
- MATH426 - Numerical Linear Algebra
- MATH447 - Probability Models
- MATH448 - Computational Statistics
- Two other math courses numbered 300 or higher. At least one of them must be MATH360 or MATH450.

Sample Schedule for Graduation in 4 Years

	Fall Semester	Spring Semester
First Year	• MATH140 - Calculus I • CS 110	• MATH141 - Calculus II • MATH260 - Linear Algebra • PHYSIC113
Second Year	• MATH242 - Multivariable and Vector Calculus • MATH291 - Mathematical Software • PHYSIC114	• MATH 265 - Discrete Structures in Mathematics • MATH 270/310 - Applied Ordinary Diff Eqs. • Science elective 1
Third Year	• MATH314/280 - Introduction to Proofs • MATH425 - Numerical Analysis Science elective 2	• MATH 345 - Probability and Statistics • MATH 426 - Numerical Linear Algebra • Science elective 3
Fourth Year	• MATH447 - Probability Models Math elective 1	• MATH 458 - Computational Statistics Math elective 2

Learning Outcomes

After completion of this concentration the student should be able to:

- Demonstrate the ability to design mathematical models for problem solving.
- Apply mathematical analysis and problem-solving skills in a broad range of real life challenges arising in biological, physical, or social sciences and engineering.
- Use mathematical methods to solve problems in public or private services.
- Have familiarity with modern computer technology, software, and algorithmic processes necessary in quantitative analysis and mathematical modeling.
- Have the ability to communicate effectively and to function well in multidisciplinary projects.
- Use basic computer technology, software, and algorithmic processes necessary in quantitative analysis, mathematical modeling and industry applications.